

Remarks

Rejections Under 35 USC §112, second paragraph

Claims 52-62 and 70-77 have been rejected under 35 USC §112, second paragraph as being indefinite. These rejections are traversed.

The 35 USC §112, second paragraph, rejections are based on limitations in independent claims 52, 56, 60 and 70.

a) With respect to the limitation "a plurality of conductors in electrical communication with the component contacts configured to redistribute the component contacts on the good components", the Examiner asks "how is the plurality of conductors configured to redistribute the component contacts on the good components?"

For an explanation, the specification and drawings of the application must be read and understood. Claims are to be read in light of the specification. In re Okuzawa, 537 F.2d 563, 190 USPQ 464 (CCPA 1976). In addition, only a person of ordinary skill in the art to which the invention pertains need be enabled by the application disclosure. In re Naquin, 158 USPQ 317 (CCPA 1968).

Accordingly, the present disclosure is directed to artisans of ordinary skill in semiconductor packaging. These artisans are intelligent, and have a good command of the English language. In addition, these artisans are familiar with the interpretation of drawings. Accordingly, it is submitted that one skilled in the art would understand the stated configuration of the conductors. Further, a claim can omit information that would be obvious

to a person of ordinary skill in the art. In re Skrivan, 427 F.2d 804, 166 USPQ 85 (CCPA 1970).

For an explanation of the above quoted claim limitation, initially please note page 7, line 26-29 of the specification.

"For example, the testing step can be used to "identify" defective components 12D (Figure 4) and to "locate" the defective components 12D, as well as the "good" components 12."

In Figure 4, the substrate 10 of the presently claimed component includes good components 12 and defective components 12D. In addition, as shown in Figure 2F, the component includes conductors 22 on the substrate 10. As stated on page 10, lines 22-30 of the specification:

"In addition, the conductors 22 can be configured to locate or "fan out" terminal contacts (e.g., solder balls) for the components 12 in a desired pattern, such as a dense grid array. Redistribution layers are well known in the art of semiconductor manufacture for configuring different types of components."

From the above disclosure, one skilled in the art would know that the conductors 22 are configured to perform the stated redistribution function. However, as an added feature, the conductors 22 are configured to repair the defective components 12D. This is a first feature which makes the present component novel and unobvious over the art. Specifically, conductors which perform the dual function of redistribution and repair of the defective components. Secondly the conductors have a pattern which contains digital data representative of the locations of the good components, the defective component, and the component contacts.

In regard to these features, please note page 13, line 22, to page 14, line 9, of the specification.

"Referring again to Figure 1, the redistribution layer 20 can be etched with the conductors 22 in patterns selected to achieve different objectives. As a first example, the redistribution layer 20 can be etched to repair or re-configure defective components 12D (Figures 4 and 5). Specifically, the initial testing step identifies the defective components 12D and *this information is contained in the digital data 36 (Figure 3)* supplied to the modulator 34. Some defects can be corrected by providing conductors 22 that substitute redundant circuitry contained on the defective components 12D for defective circuitry.

Other defects can be corrected by configuring or re configuring the component 12D in a particular electrical format. For example, a memory component (e.g., DRAM) may be defective when configured as a 1 Meg X 16 device (i.e., 1 megabit deep by 16 bits wide = 16 megabits of total memory). However, the memory component may not be defective when configured as a 4 Meg X 4 device (i.e., 4 megabits deep by 4 bits wide = 16 megabits of total memory). By electrically connecting, or alternately electrically isolating, selected component contacts 28 using the conductors 22 different configurations can be achieved." (*italics added*)

In view of the above disclosure it is submitted that one skilled in the art would understand the objected to claim limitation.

b) With respect to the limitation "and to repair the defective component by connecting selected component contacts on the defective component with selected integrated circuits on the defective component", the Examiner asks "it is not clear how a defective component may be repaired by connecting the defective component with other integrated circuits on the defective component. The limitation states that the component is itself defective, so how can it be repaired by connecting to itself?"

For an explanation, the limitation must again be interpreted in the context of the specification and drawings, and from the viewpoint of one skilled in the art of semiconductor packaging. As stated on page 13, lines 31-33 of the specification:

"Some defects can be corrected by providing conductors 22 that substitute redundant circuitry contained on the defective components 12D for defective circuitry."

The defective component is not being repaired "by connecting to itself" as suggested by the Examiner, and the claims do not say this. Rather, the defective component is being repaired by the "conductors" placing "selected circuitry" (i.e., redundant circuitry) in electrical communication with "selected component contacts". It is submitted that one skilled in the art of semiconductor packaging would understand the above limitations in the context of the present disclosure. Accordingly, the rejections under 35 USC §112, second paragraph are submitted to be in error.

Rejections Under 35 USC §102

Claims 52-62 and 70-77 have been rejected under 35 USC §102(b) as being anticipated by Hsuan et al. (US Patent No. 6,214,630).

The rejections under 35 USC §102 are traversed for the reasons to follow.

Argument

A proper 35 USC §102 rejection requires that each and every limitation of the claimed invention be disclosed in a single prior art reference. In addition, the reference

must be enabling and describe the applicant's claimed invention sufficiently to have placed it in possession of a person of ordinary skill in the field of the invention. In re David C. Paulsen, 30 F.3d 1475, 31 USPQ 2d (BNA) 1671, (U.S. App 1994).

The present component includes a substrate 10 having a plurality of components 12. In addition, each component 12 includes conductors 22 (Figure 2F) configured to perform the dual function of redistributing component contacts 28 (Figure 4) on the good components 22, and of either repairing, reconfiguring, or electrically isolating defective components 12D (Figure 4).

The feature of conductors configured to perform the dual function of repair and redistribution is not disclosed or enabled by Hsuan et al. In addition, the feature of conductors having a pattern containing digital data representing the locations of the good component, the defective component and the component contacts is not disclosed or enabled by Hsuan et al. Rather, in Hsuan et al. laser melting of fuses 118 (Figure 3) is used to repair inoperative memory cells. As stated at column 5, lines 54-60 of Hsuan et al.:

"Next, the fourth step 50 is a first repair process, in which each inoperative IC component found in the first testing process 40, if any, is disconnected from active use by using laser means to melt away the associated one of the first set of fuses 118. In the case of memory device, for example, the inoperative memory cell can be replaced by a backup one."

Admittedly, Hsuan et al. includes metallization layers 134a, 134b which function as a redistribution line structure (column 6, lines 11-19). However, this redistribution line structure is not configured to repair defective components, and does not have a pattern

containing digital data. In this regard, in Hsuan et al. the defective components are initially repaired, and then the redistribution line structure is formed in the packaging stage 12 (column 6, lines 11-19). A second repair process is then performed using "laser means to melt away the associated one of the second set of fuses 136" (column 6, lines 49-52).

The present component does not require fuses because it includes redistribution conductors which have "a pattern containing digital data representing locations of the good components, the defective component and the component contacts." The Examiner has characterized the above limitation as a "product by process" limitation, which has been given no patentable significance. However, this interpretation is incorrect, as the pattern of the conductors is a physical characteristic which produces an unobvious component.

The present conductors include physical characteristics corresponding to digital data generated by testing of the components. For example, if the digital data indicates a component is defective, the pattern of the conductors includes some conductors that substitute redundant circuitry on the defective component. The presently claimed conductors are different than conventional repair conductors, such as the redistribution line structure in Hsuan et al., which includes fuses and no digital data. The fuses are an additional element, which make the component more complicated, and require an additional process step (e.g., blowing).

As a supplement to the above argument, the cited case law on "product by process" claims recognizes that unique physical features can be present in a product as a result

of it's fabrication process. In this case the burden is on the Applicant to establish the product is unobvious over prior art products. In the present component, the conductors have physical features not found in conventional conductors. For example, the conductors have a pattern which provides for repair of only the defective components. In addition, the conductors do not require fuses to perform the repair function. Further, the conductors provide an improved product because fuses are not required to repair defective components. Both the unique structure of the conductors (e.g., the pattern containing digital data), and the improved results provided by the conductors (e.g., no blowing of fuses) are indicia of unobviousness.


In order to emphasize the unique physical characteristics of the conductors, each of the independent claims has been amended to recite "the pattern containing digital data representing locations of the good components, the defective component and the component contacts." Antecedent basis for "the pattern containing" recitation is provided on page 13, lines 27-29 of the specification. In addition, reference to a testing step has been deleted from the amended claims, such that no process limitations are present.

Conclusion

In view of the amendments and arguments, favorable consideration and allowance of claims 52-62 and 70-77 is respectfully requested. Should any issues arise that will advance this case to allowance, the Examiner is asked to contact the undersigned by telephone.

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